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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,446	01/02/2002	Toshitsugu Yamamoto	009683-392	8139

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EXAMINER	
THOMPSON, JAMES A	

ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 07/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/032,446	YAMAMOTO, TOSHITSUGU	
	Examiner	Art Unit	
	James A. Thompson	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 May 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-6,10 and 13-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/9/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see page 9, lines 7-13, filed 09 May 2006, with respect to the objection to the Information Disclosure Statement have been fully considered and are persuasive. Examiner greatly appreciates Applicant supplying the additional copy of the Floyd reference for the completeness of the case file. The objection to the Information Disclosure Statement listed in item 2 of the previous office action, dated 3 February 2006 and mailed 9 February 2006, has been withdrawn.

2. Applicant's arguments, see page 9, lines 14-16, filed 09 May 2006, with respect to the objection to the specification have been fully considered and are persuasive. The objection to the specification listed in item 3 of said previous office action has been withdrawn.

3. Applicant's arguments, see page 9, lines 17-19, filed 09 May 2006, with respect to the objections to the drawings have been fully considered and are persuasive. The objections to the drawings listed in items 4-5 of said previous office action have been withdrawn.

4. Applicant's arguments, see page 9, lines 20-24, filed 09 May 2006, with respect to the rejections of claims 4 and 14 under 35 USC §112, 2nd paragraph have been fully considered and are persuasive. The rejections of claims 4 and 14 under 35 USC §112, 2nd paragraph listed in items 6-8 of said previous office action have been withdrawn.

5. Applicant's arguments, see page 10, lines 1-9, filed 09 May 2006, with respect to the rejection of claim 9 under 35 USC §101 have been fully considered and are persuasive. The rejection of claim 9 under 35 USC §101 listed in items 9-10 of said previous office action has been withdrawn.

6. Applicant's arguments filed 09 May 2006 have been fully considered but they are not persuasive.

Regarding page 10, line 10 to page 13, line 3:

Applicant argues that Ishiguro (US Patent 6,501,566 B1) does not teach a) using a threshold value in a binarization process which is smaller than a central value of possible values as claimed in claims 1 and 10 [and previously claimed as claims 3 and 12]; and b) using a threshold value in a binarization process higher than a central value of possible values as claimed in claim 6.

Examiner replies that, with respect to a), there are three threshold values used in the error diffusion, namely T1=21, T2=127, and T3=212. When the pixel value is converted to P=00 (thus placing the pixel into the group S1), the calculated error is D'-0 (column 8, lines 41-45 of Ishiguro). Thus, a threshold value (T1) is used in a binarization process (setting pixel value to 00) which is smaller than a central value of possible values (T2 is the central value of the three possible values of T1, T2 and T3 - T1 is smaller than T2).

Examiner replies that, with respect to b), the recited limitation in dispute is a limitation that has been newly added to claim 6. However, similar reasoning applies since T3 is greater than T2.

Regarding page 13, lines 4-8:

Applicant argues that Ishiguro does not solve the same problem as disclosed by Applicant.

Examiner replies that the limitations specifically recited in claims 1, 6 and 10 are taught by the prior art, and thus the claims are rendered obvious under 35 USC §103(a). Further, Examiner wishes to note that, due to the present amendments to the claims, all claims are rejected under 35 USC §103(a) below instead of 35 USC §102(e) as in said previous office action since the present amendments to the independent claims incorporate subject matter that was determined to be obvious to one of ordinary skill in the art at the time of the invention, rather than subject matter that was deemed anticipated by Ishiguro.

Regarding page 13, lines 9-17:

Applicant argues that Ishiguro does not teach performing calculation and distribution of error based on pixel representation as claimed in claims 1, 6 and 10.

Examiner replies that the limitation under dispute was originally recite in claims 2 and 11, which have now been incorporated into claims 1 and 10 and similar language incorporated into claim 6. Examiner did not state or suggest in said previous office action that said limitation was taught solely by Ishiguro. Instead, as set forth in said previous office action, said limitation is taught by the combination of Ishiguro and obvious engineering design choice.

Regarding page 13, line 18 to page 14, line 6:

Applicant argues that claims 4-5 and 13-14 would not have been obvious over Ishiguro and engineering design choice.

Examiner replies that Applicant provides no additional reasons beyond the dependencies of claims 4-5 and 13-14. Since claims 1 and 10 are demonstrated above to be obvious over Ishiguro and obvious engineering design choice, claims 4-5 and 13-14 cannot be considered allowable merely owing to their respective dependencies from claims 1 and 10.

Regarding page 14, lines 7-20: Examiner has fully considered the newly added claims 15-17. The new grounds of rejection set forth below include: (1) obviousness rejections for claims 1 and 10 under 35 USC §103(a) rather than anticipation rejections under 35 USC §102(e) since obvious, but not anticipated, subject matter previous rejected under 35 USC §103(a) has been incorporated into claims 1 and 10; (2) an obviousness rejection for claim 6 under 35 USC §103(a) rather than an anticipation rejection under 35 USC §102(e) since obvious, but not anticipated, subject matter from the previously recited claim 7 and new subject matter has been introduced into claim 6; and (3) rejections of newly added claims 15-17. The new grounds of rejection have been necessitated by the present amendments to the claims.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1, 4-6, 10 and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishiguro (US Patent 6,501,566 B1) in view of obvious engineering design choice.

Regarding claims 1 and 10: Ishiguro discloses an image processing apparatus (figures 1-5 and column 4, lines 8-19 of Ishiguro) comprising:

- an input unit (figure 3(41) of Ishiguro) successively receiving, as inputs, image signals representing pixels (column 6, lines 23-27 and lines 40-41 of Ishiguro).
- a determining unit (figure 3(42); figure 4; column 6, lines 47-51; and column 6, line 64 to column 7, line 9 of Ishiguro) determining whether an input signal represents a white pixel (column 8, lines 46-53 of Ishiguro). Input pixels are error corrected and placed into one of four possible locations (figure 8 and column 8, lines 41-48 of Ishiguro). Since the groupings are evenly distributed, a white pixel (D=0) will necessarily be placed within the first group (D'=0~41) since the error to be distributed will not exceed +41. In figure 8 of Ishiguro, it can be seen that 126-85=41 (second group (D'=42~126)); 211-170=41 (third group (D'=127~211)); and the error for the fourth group (D'=212~255) will be negative. Thus, a white input pixel will necessarily be grouped in the first group and processed differently from pixels that are not white, specifically pixels that have values D'=42~255.
- an error diffusion processing unit (figure 3(43-45) and column 8, lines 46-64 of Ishiguro) which outputs a signal representing a white pixel (figure 8 and column 8, lines 46-53 of Ishiguro) and calculates an error of zero and subsequent distribution of zero error to pixels (column 8,

lines 51-53 of Ishiguro (D'-0=0 if D'=0)), when the input signal represents a white pixel (figure 8 and column 8, lines 46-53 of Ishiguro).

- said error diffusion processing unit performs error diffusion process using a threshold value (T1) in a binarization process (pixel value P=00, 01, 10 or 11 - see column 8, lines 48-64 of Ishiguro) smaller than a central value (T2=127) of possible values of said image signal (figure 8 and column 8, lines 46-53 of Ishiguro).

Ishiguro does not disclose expressly that said error diffusion processing unit does not perform error calculation and subsequent distribution of error.

However, it would have been an obvious engineering design choice to simply not perform the error and error distribution calculations when the input pixel is white. Since the error for a white pixel is zero, and the subsequent error values to be distributed are zero, then eliminating the steps of error calculation and error distribution would be an obvious design modification to make since eliminating a superfluous step would increase the overall speed of image processing. An additional motivation to perform such an obvious engineering design choice would be to enhance a particular desired level (column 9, lines 27-35 of Ishiguro).

Further regarding claim 10: The apparatus of claim 1 performs the method of claim 10.

Regarding claims 4 and 13: Ishiguro discloses that said error diffusion processing unit changes the threshold value in accordance with a magnitude of the signal input through said input unit (figure 8 and column 8, lines 46-59 of Ishiguro).

Regarding claims 5 and 14: Ishiguro discloses that said error diffusion processing unit performs a process of subtracting a prescribed value before distributing a calculated error (figure 5(#5); figure 8("Error E" column in table); and column 8, lines 50-64 of Ishiguro), and adding the prescribed value before performing thresholding (figure 3(41,D,R,D') and column 6, lines 64-67 of Ishiguro).

Regarding claim 6: Ishiguro discloses an image processing apparatus (figures 1-5 and column 4, lines 8-19 of Ishiguro) comprising:

- an input unit (figure 3(41) of Ishiguro) successively receiving, as inputs, image signals representing pixels (column 6, lines 23-27 and lines 40-41 of Ishiguro).
- a determining unit (figure 3(42); figure 4; column 6, lines 47-51; and column 6, line 64 to column 7, line 9 of Ishiguro) determining whether an input signal represents a black pixel (column 8, lines 46-49 and lines 62-64 of Ishiguro). Input pixels are error corrected and placed into one of four possible locations (figure 8 and column 8, lines 41-48 of Ishiguro). Since the groupings are evenly distributed, a black pixel (D=255) will necessarily be placed within the fourth group (D'=212~255) since the error to be distributed will not be less than -43. In figure 8 of Ishiguro, it can be seen that the error for the first group (D'=0~41) will be positive; 42-85=-43 (second group (D'=42~126)); and 127-170=-43 (third group (D'=127~211)). Thus, a black input pixel will necessarily be grouped in the fourth group and processed differently from pixels that are not black, specifically pixels that have values D'=0~212.

- an error diffusion processing unit (figure 3(43-45) and column 8, lines 46-64 of Ishiguro) which outputs a signal representing a black pixel (figure 8 and column 8, lines 46-48 and lines 61-64 of Ishiguro) and calculates an error of zero and subsequent distribution of zero error to pixels (column 8, lines 61-64 of Ishiguro (D'-255=0 if D'=255)), when the input signal represents a black pixel (figure 8 and column 8, lines 46-48 and lines 61-64 of Ishiguro).
- said error diffusion processing unit performs error diffusion process using a threshold value (T3) in a binarization process (pixel value P=00, 01, 10 or 11 - see column 8, lines 48-64 of Ishiguro) higher than a central value (T2=127) of possible values of said image signal (figure 8 and column 8, lines 46-53 of Ishiguro).

Ishiguro does not disclose expressly that said error diffusion processing unit does not perform error calculation and subsequent distribution of error.

However, it would have been an obvious engineering design choice to simply not perform the error and error distribution calculations when the input pixel is black. Since the error for a black pixel is zero, and the subsequent error values to be distributed are zero, then eliminating the steps of error calculation and error distribution would be an obvious design modification to make since eliminating a superfluous step would increase the overall speed of image processing. An additional motivation to perform such an obvious engineering design choice would be to enhance a particular desired level (column 9, lines 27-35 of Ishiguro).

Regarding claim 15: Ishiguro discloses an image processing apparatus (figures 1-5 and column 4, lines 8-19 of Ishiguro) comprising:

- an input unit (figure 3(41) of Ishiguro) successively receiving as inputs, image signals representing pixels (column 6, lines 23-27 and lines 40-41 of Ishiguro).
- a determining unit (figure 3(42); figure 4; column 6, lines 47-51; and column 6, line 64 to column 7, line 9 of Ishiguro) determining whether an input signal represents a white pixel or a black pixel (column 8, lines 46-53 and lines 62-64 of Ishiguro). Input pixels are error corrected and placed into one of four possible locations (figure 8 and column 8, lines 41-48 of Ishiguro). Since the groupings are evenly distributed, a black pixel (D=255) will necessarily be placed within the fourth group (D'=212~255) since the error to be distributed will not be less than -43. In figure 8 of Ishiguro, it can be seen that the error for the first group (D'=0~41) will be positive; $42-85=-43$ (second group (D'=42~126)); and 127-170=-43 (third group (D'=127~211)). Thus, a black input pixel will necessarily be grouped in the fourth group and processed differently from pixels that are not black, specifically pixels that have values D'=0~212. Further, a white pixel (D=0) will necessarily be placed within the first group (D'=0~41) since the error to be distributed will not exceed +41. In figure 8 of Ishiguro, it can also be seen that 126-85=41 (second group (D'=42~126)); 211-170=41 (third group (D'=127~211)); and the error for the fourth group (D'=212~255) will be negative. Thus, a white input pixel will necessarily be grouped in the first group and process-

ed differently from pixels that are not white, specifically pixels that have values D'=42~255.

- an error diffusion processing unit (figure 3(43-45) and column 8, lines 46-64 of Ishiguro) which outputs a signal representing the white pixel (figure 8 and column 8, lines 46-53 of Ishiguro) or the black pixel (figure 8 and column 8, lines 46-48 and lines 61-64 of Ishiguro) and calculates an error of zero and subsequent distribution of zero error to pixels (column 8, lines 51-53 (D'-0=0 if D'=0) and lines 61-64 of Ishiguro (D'-255=0 if D'=255)), when the input signal represents the white pixel (figure 8 and column 8, lines 46-53 of Ishiguro) or the black pixel (figure 8 and column 8, lines 46-48 and lines 61-64 of Ishiguro).
- said error diffusion processing unit performs error diffusion process using a threshold value (T1, T2, or T3 in figure 8 of Ishiguro) in a binarization process (pixel value P=00, 01, 10 or 11 - see column 8, lines 48-64 of Ishiguro) and changes the threshold value based on a relationship between the input and the threshold value (figure 8 and column 8, lines 46-64 of Ishiguro), wherein the relationship is that the threshold value increases depending on the increase of the input (column 8, lines 46-53 of Ishiguro). The threshold value selected depends upon which group the input pixel falls within, and thus which threshold the input pixel is closest to.

Ishiguro does not disclose expressly that said error diffusion processing unit does not perform error calculation and subsequent distribution of error if the input signal is a white pixel or a black pixel.

However, it would have been an obvious engineering design choice to simply not perform the error and error distribution calculations when the input pixel is a white pixel or a black pixel. Since the error for a white pixel is zero and the error for a black pixel is zero, and the subsequent error values to be distributed are zero, then eliminating the steps of error calculation and error distribution would be an obvious design modification to make since eliminating a superfluous step would increase the overall speed of image processing. An additional motivation to perform such an obvious engineering design choice would be to enhance a particular desired level (column 9, lines 27-35 of Ishiguro).

Regarding claim 16: Ishiguro discloses that said error diffusion processing unit performs error diffusion process using a threshold value (T1) in a binarization process (pixel value P=00, 01, 10 or 11 - see column 8, lines 48-64 of Ishiguro) smaller than a central value (T2=127) of possible values of said image signal when the input signal represents the white pixel (figure 8 and column 8, lines 46-53 of Ishiguro).

Regarding claim 17: Ishiguro discloses that said error diffusion processing unit performs error diffusion process using a threshold value (T3) in a binarization process (pixel value P=00, 01, 10 or 11 - see column 8, lines 48-64 of Ishiguro) higher than a central value (T2=127) of possible values of said image signal when the input signal represents the black pixel (figure 8 and column 8, lines 46-53 of Ishiguro).

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Thompson whose telephone number is 571-272-7441. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

James A. Thompson
Examiner
Technology Division 2625

20 July 2006

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